Importance of Pu-239 Cross Sections to Industry

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November 17, 2011
AREVA Federal Services
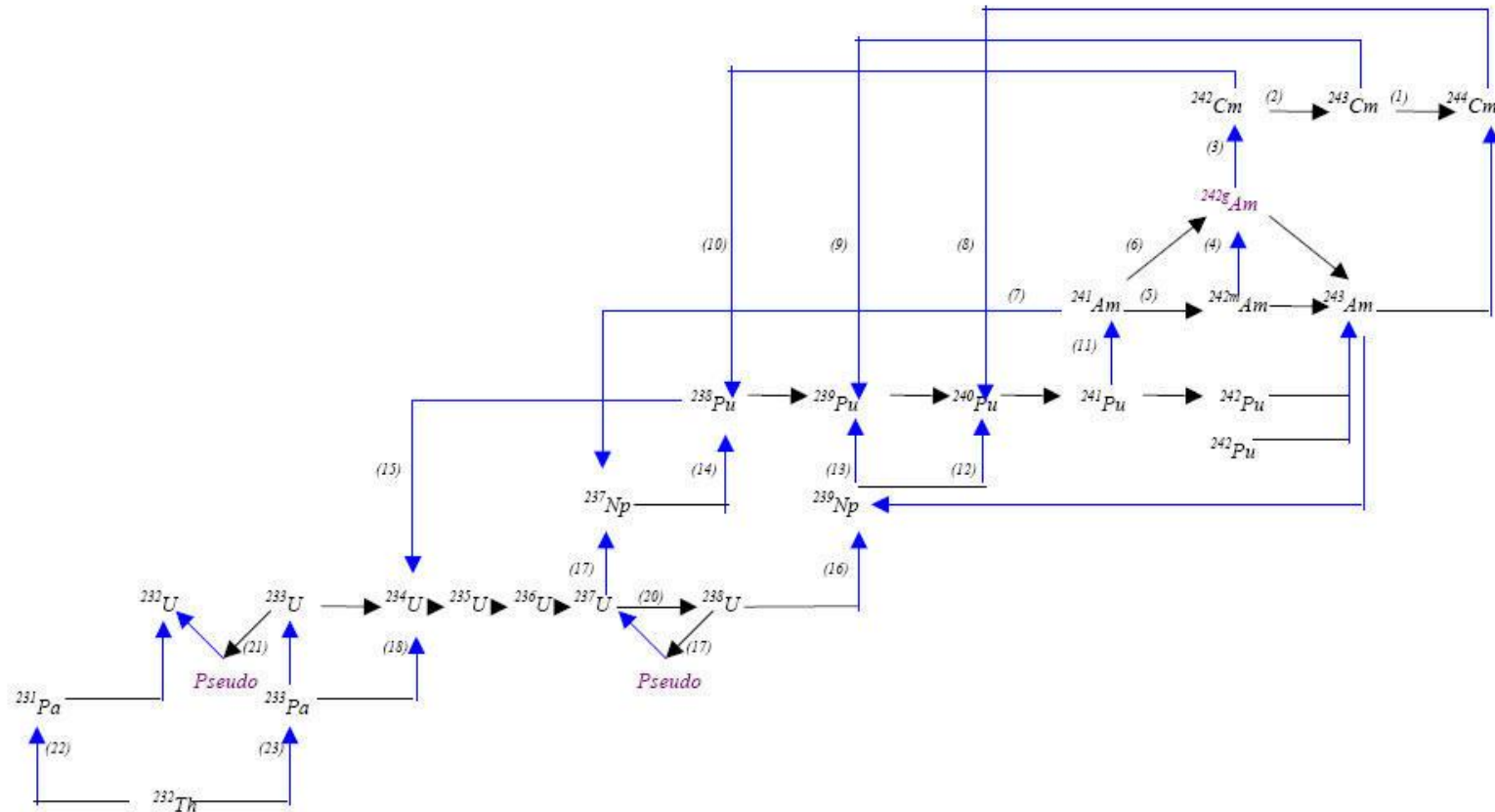
Nuclear Physics Working Group
Brookhaven National Laboratory

Industrial use of Pu-239 Cross Sections

❖ **Computer models**

❖ **Applications (fuel cycles)**

Actinide Chains of IAEA WLUP Libraries

Computer Model Chain Simplifications

"ANL library ignores the production of Pu-242 from the electron capture of Am-242"

"about 15% of Pu-242 production from the Am-241 is ignored in both WIMS-D format libraries"

- **Evaluation of the DRAGON Code for VHTR Design Analysis, ANL-GenIV-060**

use of lumped fission products

historic codes (CASMO) – 1 to 18 lumped fission products

newer codes (HELIOS) – nuclides added

latest codes (ARTEMIS) – chains are user defined

Code-to-code Comparison

APOLLO2, BOXER, CASMO-4, SCALE 4.4, HELIOS, WIMS, etc.

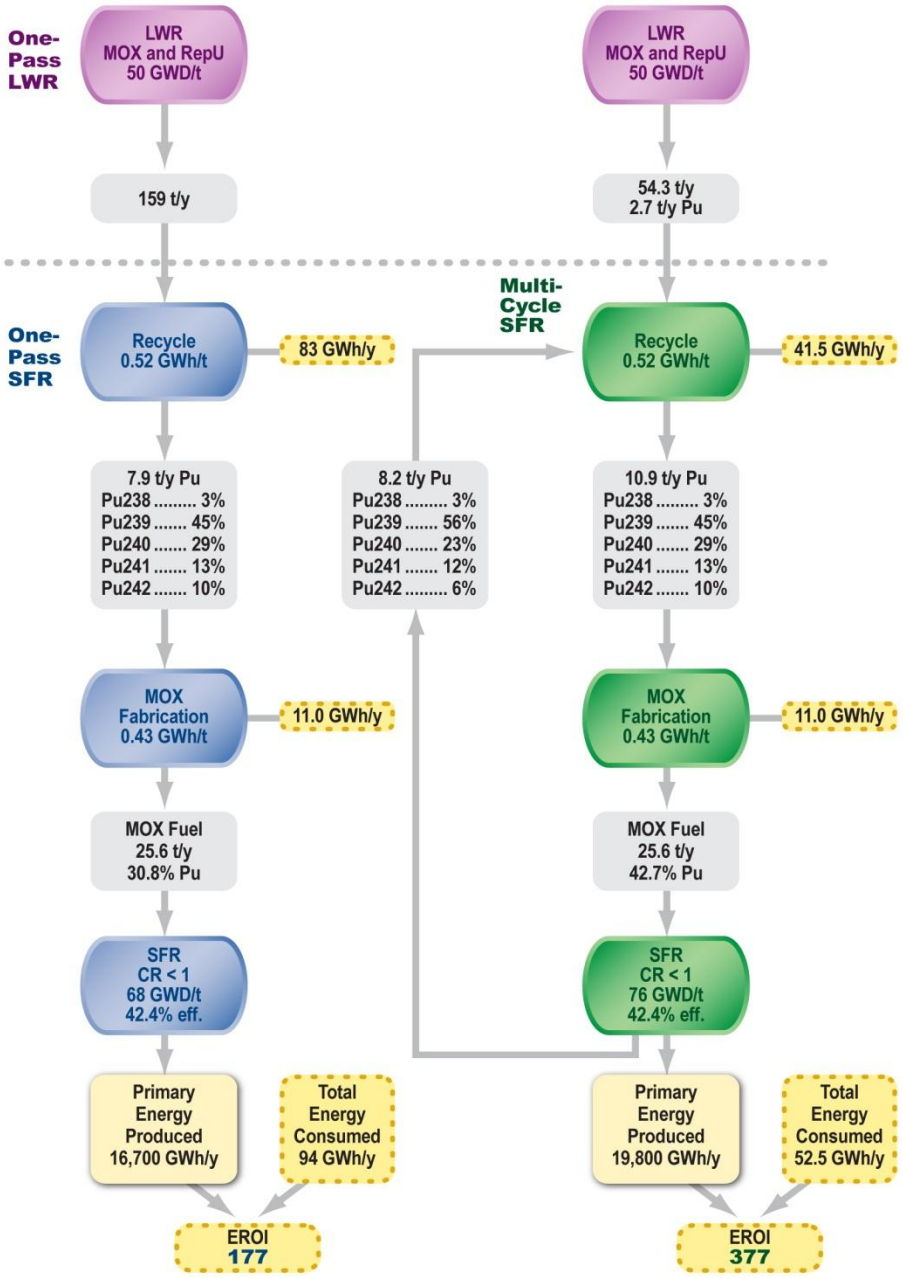### "the spread of results increases with mass number"

PHYSICS OF PLUTONIUM FUELS, BWR MOX BENCHMARK, SPECIFICATION AND RESULTS

Nuclear Science Committee, Working Party on Physics of Plutonium Fuels and Innovative Fuel Cycles, Volume VII, January 2003, Nuclear Energy Agency Organisation for Economic Co-operation and Development

LWR MOX

SFR with CR < 1

Conclusion
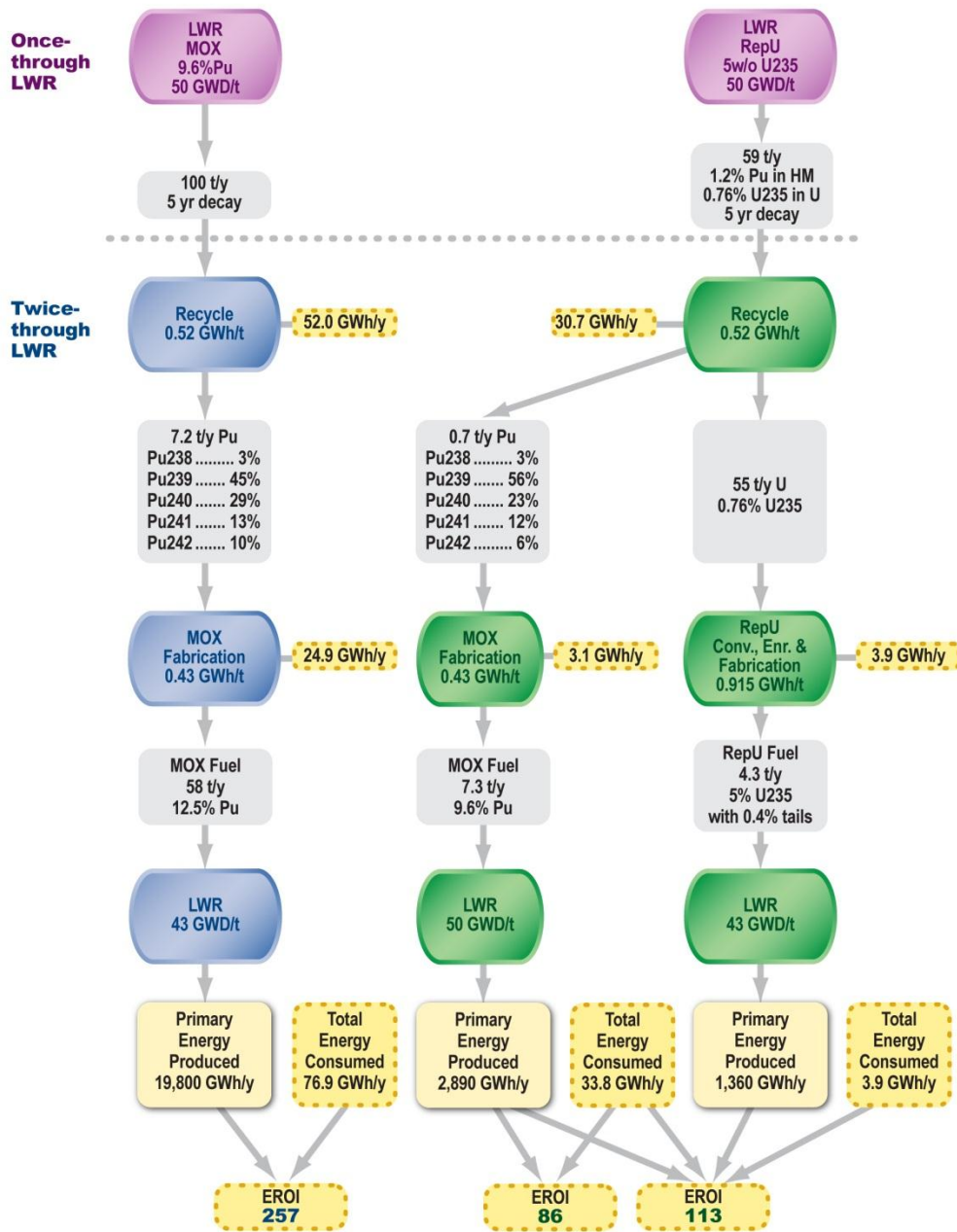
Closing the fuel cycle will require

- ❖ **Better data**
  - ➢ **Actinides**
  - ➢ **Fission products**
- ❖ **Better models**

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